FURUNO

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Installation Manual
WIRED TRAWL SONAR
TS-331A

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FURUNO ELECTRIC CO., LTD.
NISHINOMIYA, JAPAN

⚠ SAFETY INSTRUCTIONS

⚠ WARNING

ELECTRICAL SHOCK HAZARD
Do not open the equipment.

Only qualified personnel should work inside the equipment.

Turn off the power at the switchboard before beginning the installation.

Fire or electrical shock can result if the power is left on.

Do not install the surface processor unit where it may get wet from rain or water splash.

Water in the equipment can result in fire, electrical shock or damage to equipment.

Be sure that the power supply is compatible with the voltage rating of the equipment.

Connection of an incorrect power supply can cause fire or damage the equipment.

⚠ CAUTION

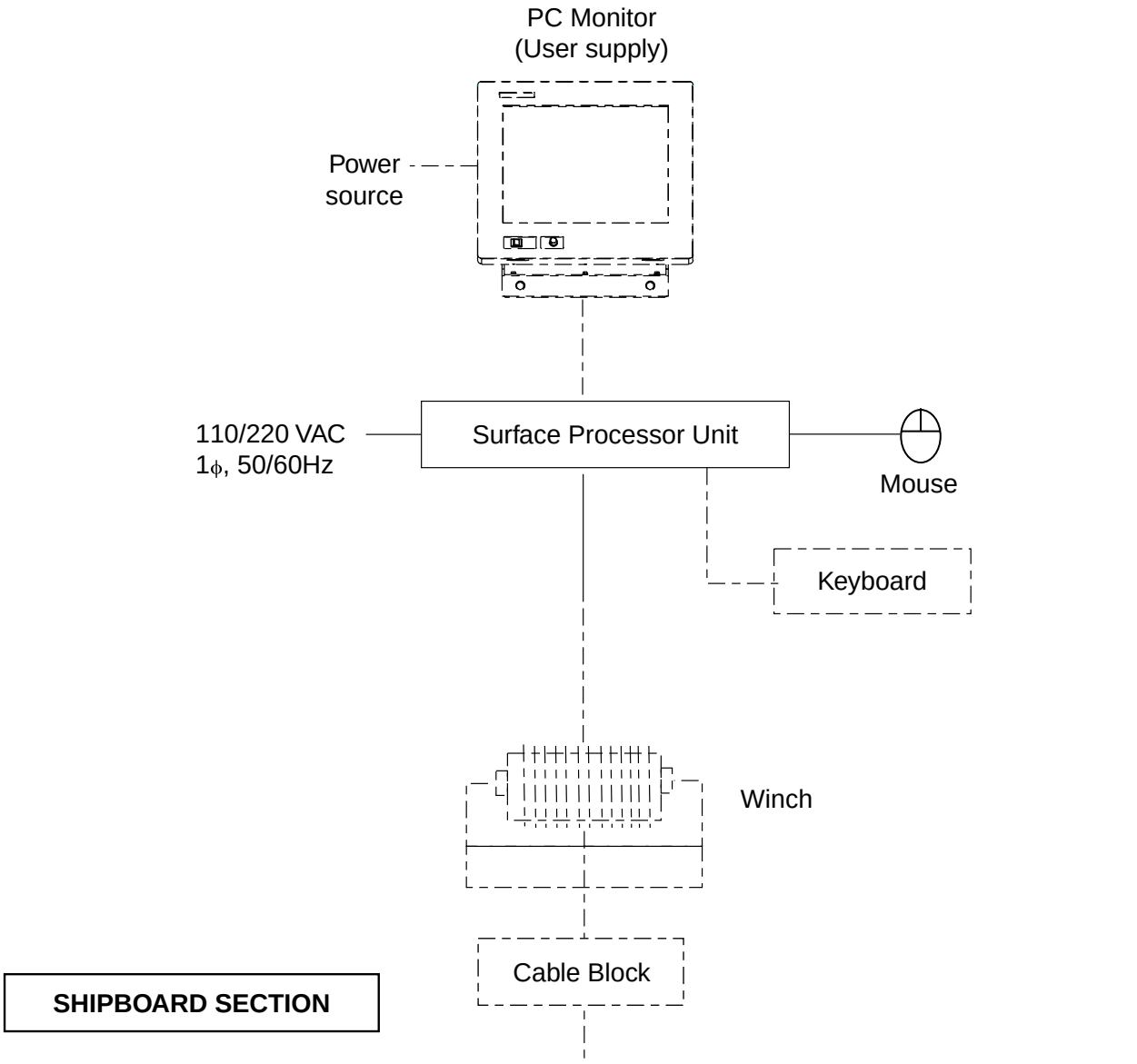
Attach protection earth securely to the ship's body.

The protection earth is required for the surface processor unit to prevent electrical shock.
When using a two prong outlet, use the adaptor with the earth wire (pin).

Observe the following compass safe distances to prevent deviation of a magnetic compass:

	Standard	Steering
Surface processor unit	0.3 m	0.3 m

SYSTEM CONFIGURATION



EQUIPMENT LISTS

Standard Supply

Name	Type	Code No.	Qty	Remarks
Surface Processor Unit	MODEL854-000-002	-	1	
Underwater Unit	MODEL854-000-360	-	1	
Installation Materials	CP01-01400	-	1	Power cable
Accessories	FP03-01100	-	1	Test cable, mouse (w/USB adapter + MS-14S connector)
	FP01-01200	-	1	U/W connector
Spare Parts	SP01-01300	-	1	Fuse

Optional Supply

Name	Type	Code No.	Qty	Remarks
Catch Sensor	CS-400	000-060-120	1	Maximum four available.

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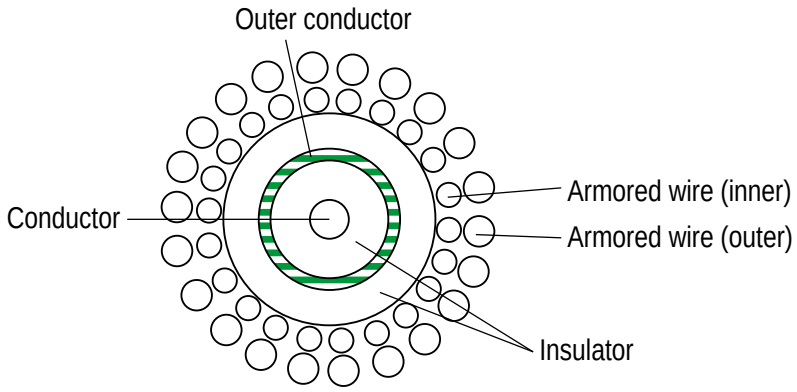
1. UNDERWATER UNIT

1.1 Wiring

The underwater unit is connected to the surface processor unit with an armored coaxial cable (user supply, maximum length: 3000 m). If necessary, a winch (local supply) is placed between the underwater unit and the surface processor unit. Recommended cable is shown below.



Recommended armored coaxial cable, sectional view

Construction

Conductor:	1.9 mm² plain copper strand (1 ea)
Insulator:	Polyethylene
Screen:	Served plain copper
Jacket:	Polyethylene
Armor wire:	Two contrahelical layers of high tensile galvanized steel wires

Mechanical

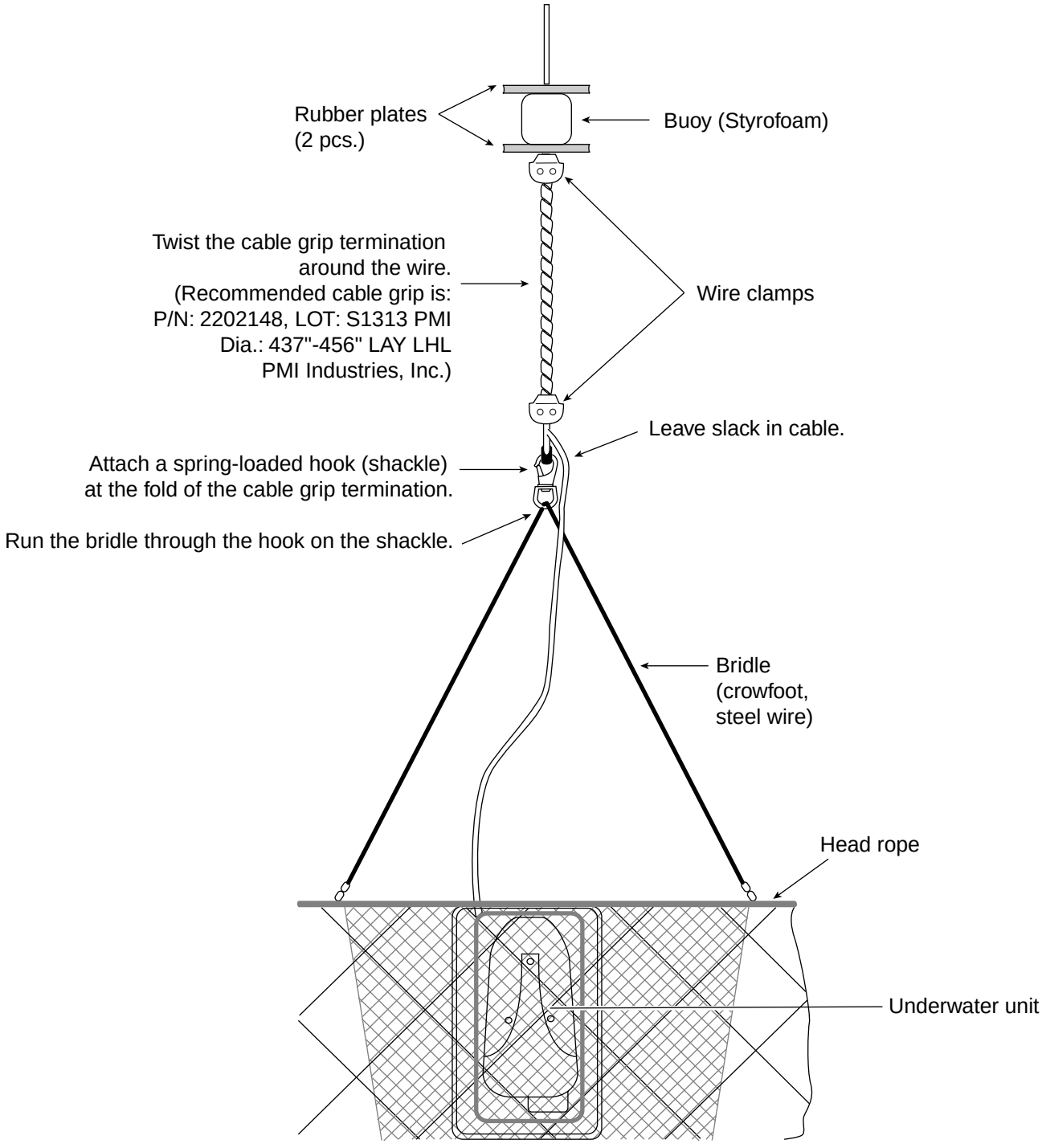
Diameter:	11.2 mm
Weight in air:	452 kg/km
Weight in seawater:	366 kg/km
Rec. bending radius:	230 mm
Breaking strength:	72 kN
Working load:	18 kN

Electrical

Maximum working voltage:	1.9 kVDC
Conductor resistance:	9.8 Ω/km for conductor, 6.9Ω/km for screen
Impedance:	40 Ω
Attenuation:	10.5 dB/km at 1 MHz, 23.3 dB/km at 5 MHz

1 .1.1 Tension relief system

The first thing to do is to construct the tension relief system, an example of which is shown below. The connection of the underwater unit is described in the next section.



Typical tension relief system

1.1.2 Connecting the armored coaxial cable and U/W connector

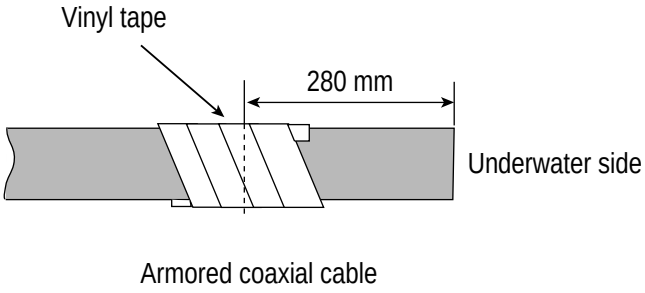
The end of the armored coaxial cable should be fabricated for connection to the underwater unit. Follow the steps shown below.

Necessary parts for fabrication

- Vinyl tape
- Self-binding tape
- Shrink tubes

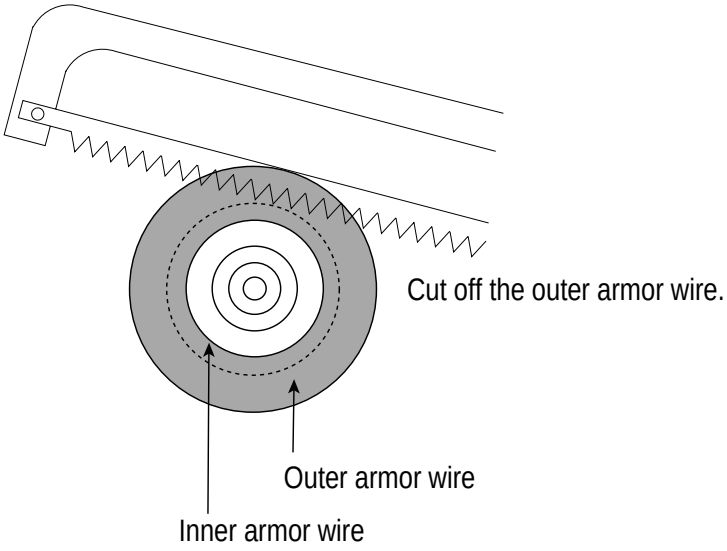
Fabricating

1. Wrap vinyl tape around the armored coaxial cable at the position of 280 mm from the end.



Winding vinyl tape

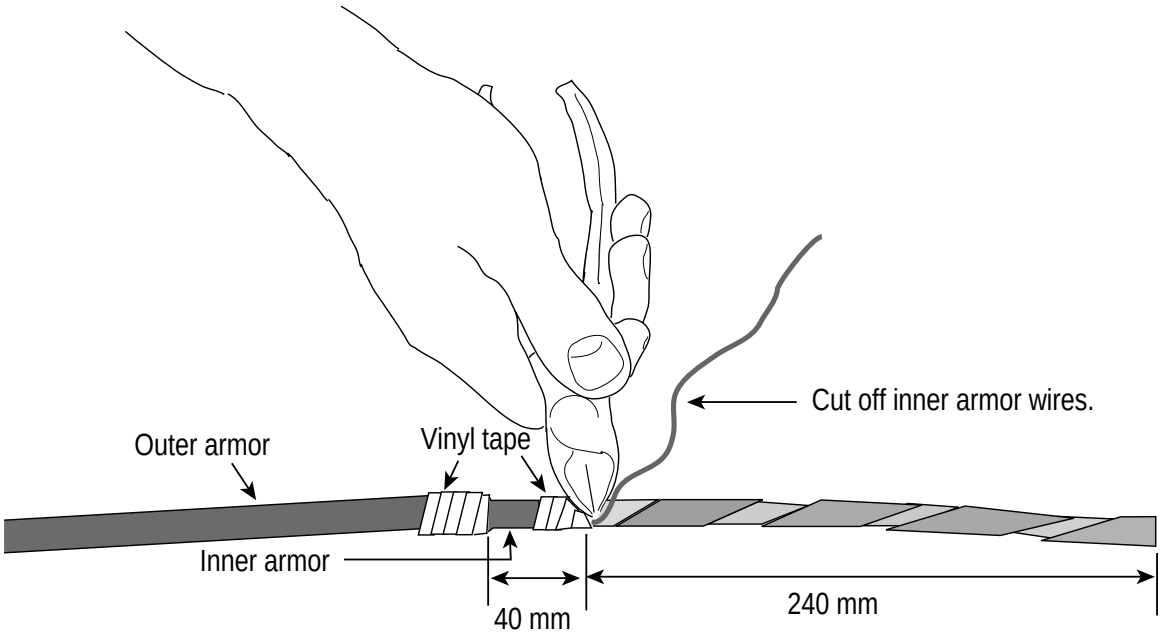
2. Cut off the outer armor wire as shown below at the position of 280 mm from the end.



Cutting outer armor wire

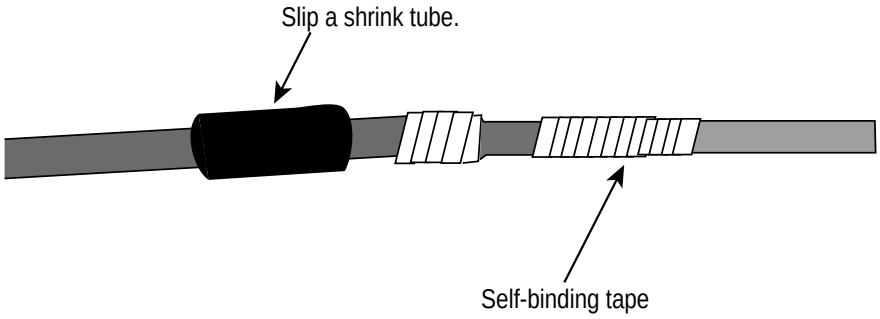
Note: Do not make scratches on inner armor wires.

3. Wrap vinyl tape around the wire at the position of 240 mm from the end, and then untwist inner armors at the position of taping.
4. Cut each wire off.



Trimming inner armors

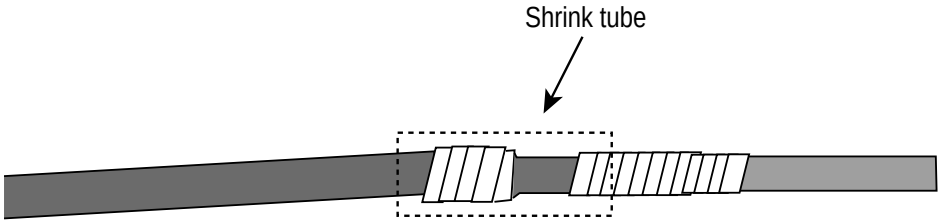
5. Wind self-binding tape (local supply) around the end of the inner armor, and then slip the shrink tube (length: approx. 100 mm, type: e.g. TMX 12.7/4.1 manufactured by Novatio, local supply) onto the cable.



Self-binding tape and shrink tubing

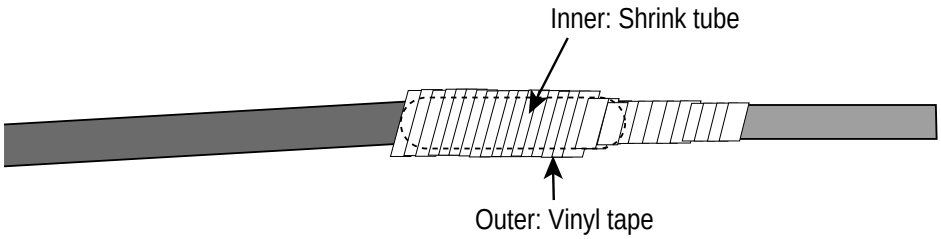
6. Shift the shrink tube to the position as below, and heat it.

   Note: Heat the shrink tubing from its center to allow air to pass out.



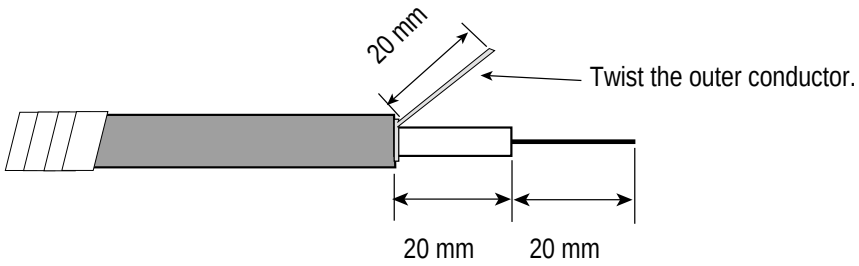
Heating the shrink tubing

7. Wrap vinyl tape with uniform thickness around the shrink tube.



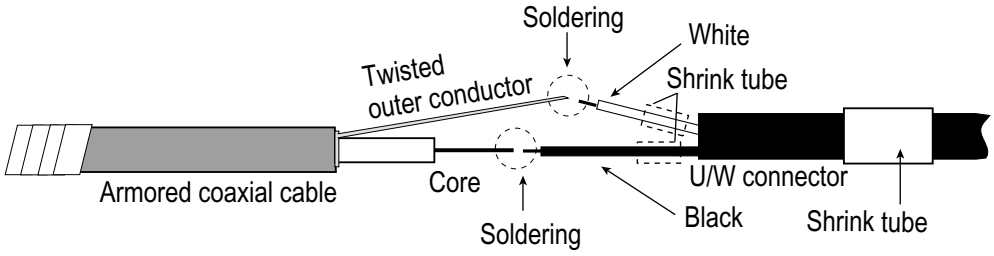
Vinyl tape and shrink tubing

8. Fabricate the end of the cable as below.



Fabricating the cable end

9. Pass the shrink tubing (type: e.g. TMX 12.7/4.1, local supply) through the U/W connector.
10. Pass the shrink tubing (type: e.g. TMX 4.8/1.5, local supply) into both of the cables of the U/W connector.
11. Solder cables as shown below.

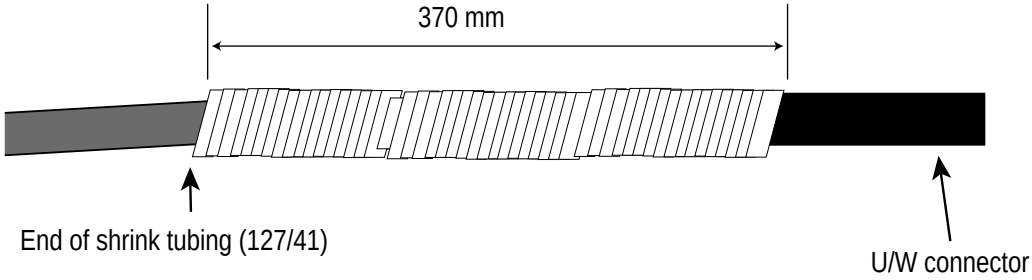


Soldering the armored coaxial cable and underwater unit cable

12. Shift the shrink tube to the position covering the connection position.
13. Heat the shrink tube.
14. Wind self-binding tape around the connection of the armored coaxial cable and U/W connector, and then wrap vinyl tape with uniform thickness over self-binding tape.
15. Slide the shrink tube onto the connection point.
16. Heat the shrink tube from its center.

    Note: Heat the shrink tubing from its center to allow air pass out.

17. Wind vinyl tape around the shrink tube.
18. Finally, wind vinyl tape as below, overlapping by 1/2 the width of the tape.

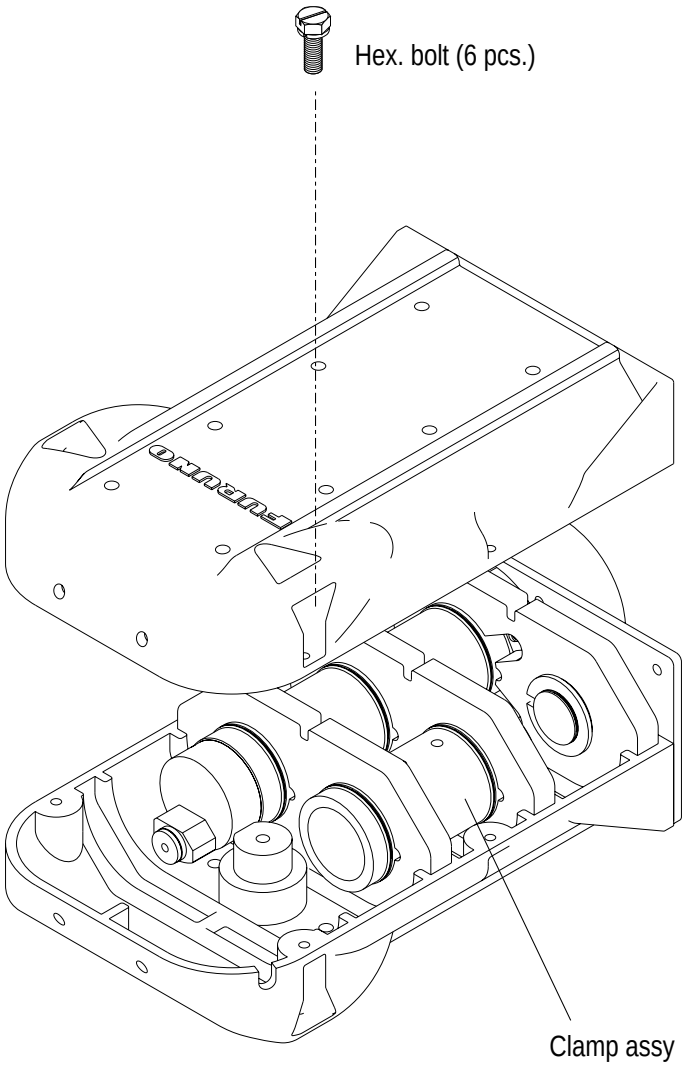


Taping

1.2 Connecting the Cable to the Underwater Unit

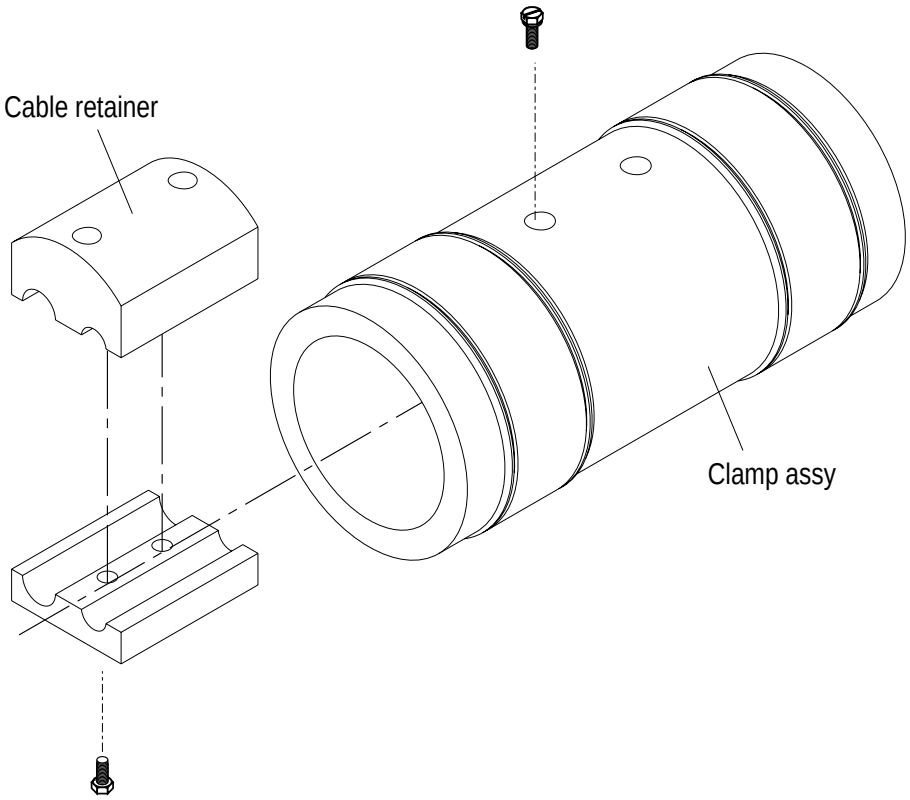
To connect the cable assy. fabricated in section “1.1.2 Connecting the armored coaxial cable and U/W connector” to the underwater unit, dismount the cable retainer from the underwater unit.

1. Unfasten six hex. bolts to open the underwater unit cover.



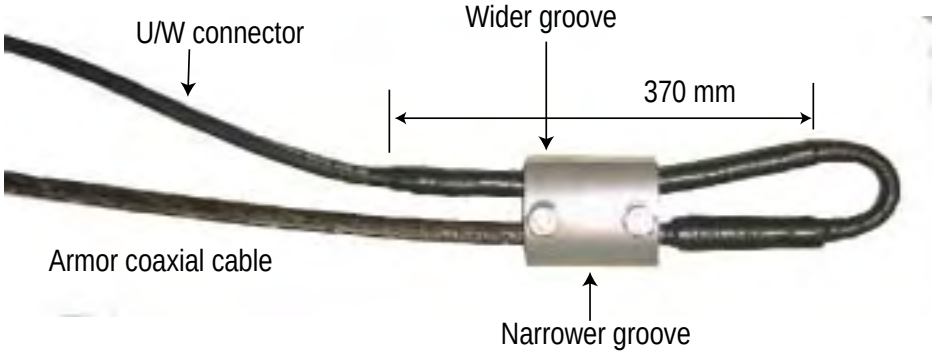
Underwater unit, cover removed

2. Loosen two bolts to dismount the cable retainer from the inside of the clamp assy.
3. Loosen two bolts to separate the cable retainer.



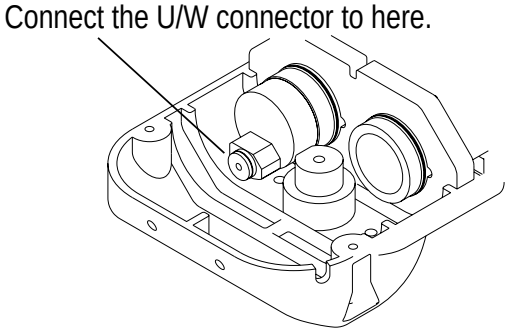
Cable retainer and clamp assy

4. Bend the cable assy. (connected in section 1.1.2), and fasten it with the cable retainer. The armor of the coaxial cable should be placed into the narrower groove.



Cable assy w/cable retainer

5. Reassemble the cable retainer, and then reattach it to the clamp assy.
6. Connect the U/W connector to the top of the vertical sonar.



Underwater unit, cover removed

Underwater unit, cover removed

7. Run the armored coaxial cable through the notch on the housing.
8. Reattach the underwater unit cover with six bolts.

2. SURFACE PROCESSOR UNIT

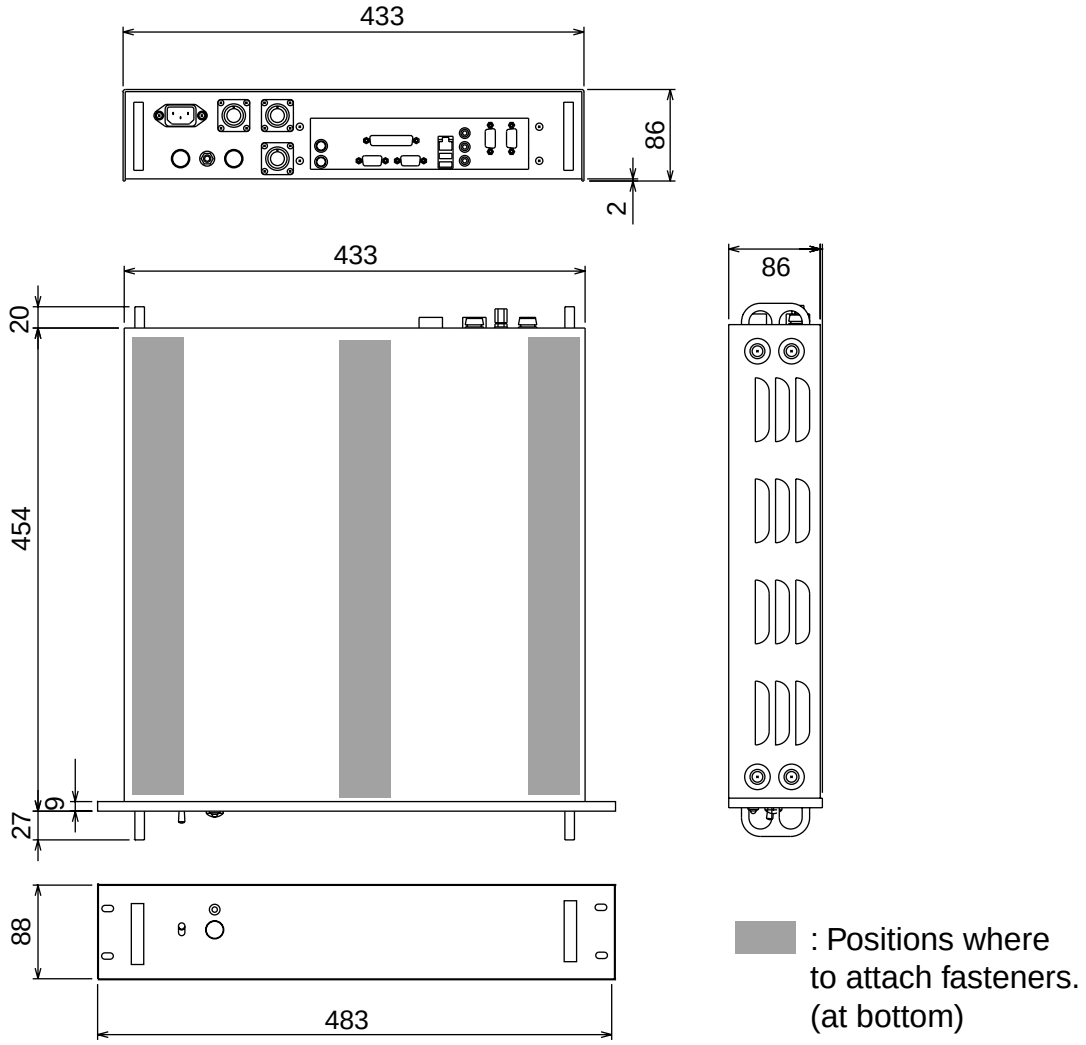
2.1 Mounting

The surface processor unit is designed to be mounted on a desktop. To fix the surface processor unit, use the following fastener or equivalent.

Note: Install the surface processor unit in the wheelhouse to prevent effects associated with vibration and water spray.

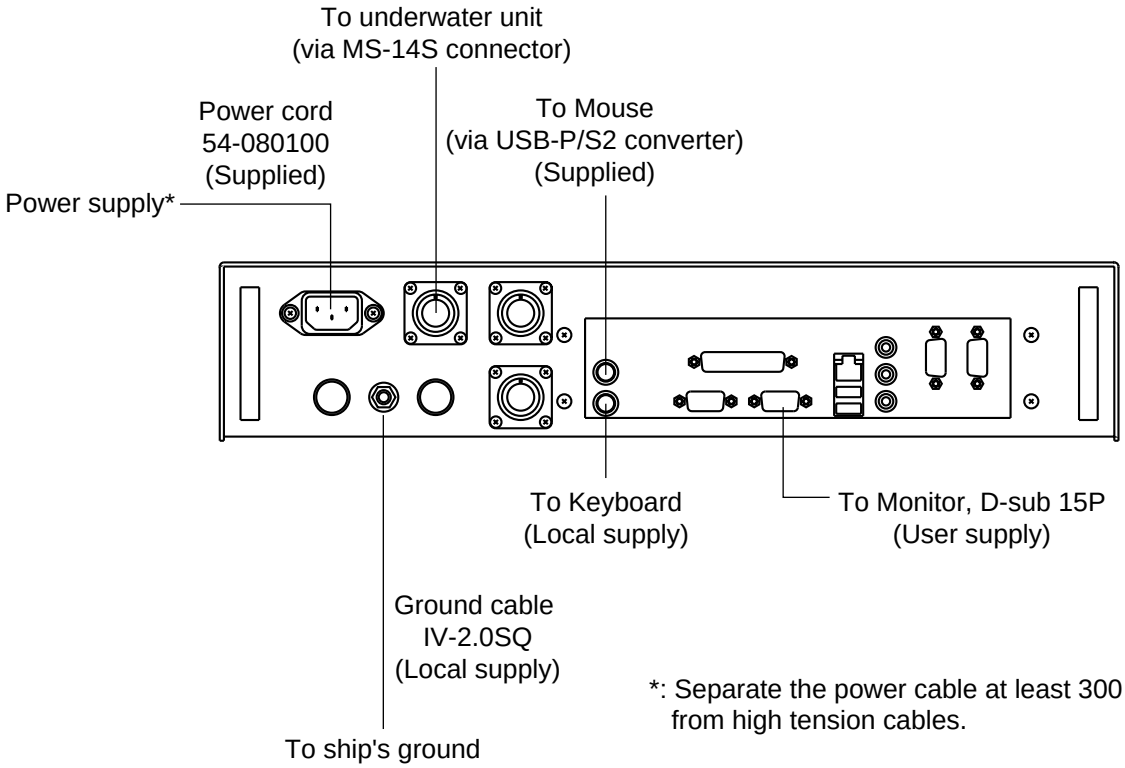
Supplier	Name	Type
3M	Dual lock fastener	SJ-3551J
		SJ-3552J

1. Cut each fastener so its length is 440 mm. Three sets are required.
2. Attach fasteners (loop-type) at the bottom of the unit and mounting location (hook type).
3. Place the unit so that the fasteners unite.



Surface processor unit, mounting dimensions

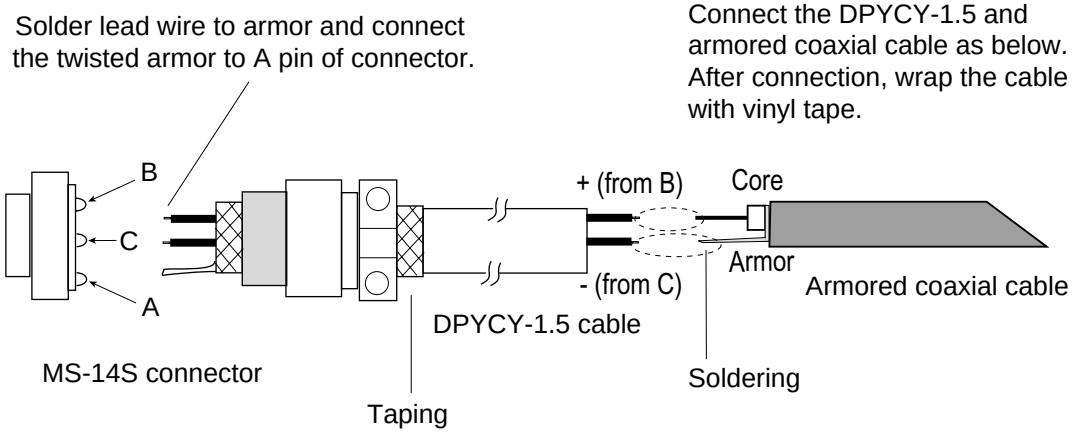
2.2 Wiring



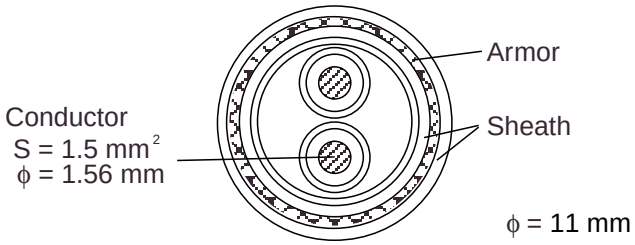
Surface processor unit, rear view

Fabricating the MS-14S connector

Use cable DPYCY-1.5 (Japan industrial standard cable) or equivalent between the MS-14S connector and armored coaxial cable. The length is determined according to the distance between the bridge and winch.



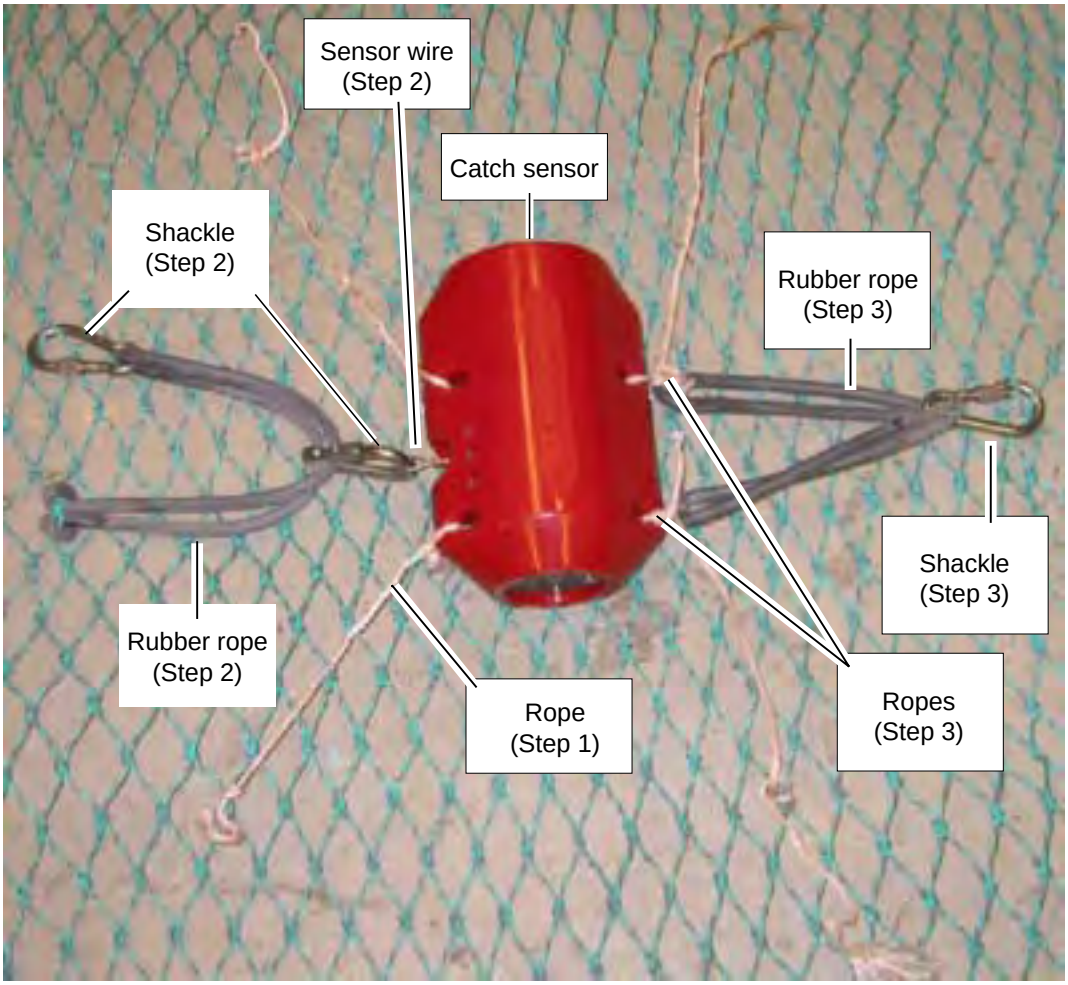
DPYCY-1.5, sectional view



3. CATCH SENSOR (OPTION)

Max. four optional catch sensors can be mounted depending on the trawl.

1. Fasten the four ropes (local supply) to fix the catch sensor to the trawl.
2. Use rubber ropes and shackles (local supply) to attach the sensor wire to the trawl.
3. Use rubber rope, a shackle and ropes (local supply) to fix the catch sensor on the opposite side of the sensor wire.



PACKING LIST TS-331A SARFACE PROCESSOR UNIT

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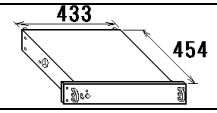
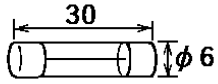
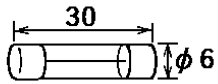
ユニット **UNIT**			
操作部 SURFACE PROCESSOR UNIT		MODEL854-000-002 000-060-122	1
予備品 **SPARE PARTS**			
管入りﾋｭｰｽﾞ FESE		2A 250V 999-999-081	2 (*1)
管入りﾋｭｰｽﾞ FESE		1A 250V 999-999-080	2 (*1)
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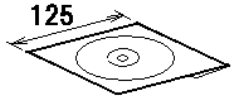
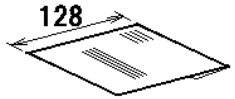
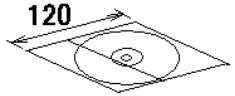
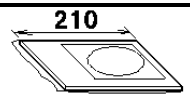
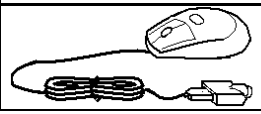
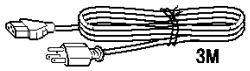
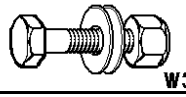
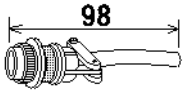
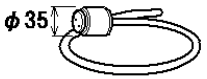
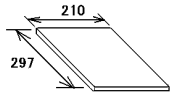
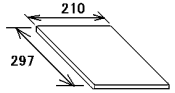
ﾏｻﾞｰﾎﾞｰﾄﾞ用ﾄﾞﾗｲﾊﾞｰCD-ROM CD-ROM(FOR MOTHER BOARD)		D845GLVA 999-999-079	1 (*1)
TS-331AｱﾌﾟﾘｹｰｼｮﾝFD FD(TS-331A APPLECATION)		TS-331A_EXE 999-999-078	1 (*1)
通信ﾎﾞｰﾄﾞ用ﾄﾞﾗｲﾊﾞｰCD-ROM CD-ROM(FOR COMMUNICATION BOARD)		PCI16C550 999-999-077	1 (*1)
WINDOWS XP CD-ROM WINDOWS XP SOFT PACK CD-ROM		38-076 999-999-037	1 (*1)
ﾏｳｽ(USBｱﾀﾞﾌﾟﾀｰ付き) MOUSE		999-999-075	1 (*1)
工事材料 **INSTALLATION MATERIALS**			
電源ｺｰﾄﾞ POWER CORD		54-080100* 999-999-083	1 (*1)

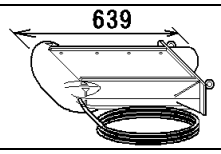
(*1)は、ﾀﾞﾐｰｺｰﾄﾞに付き、注文できません。
(*1)THIS CODE CANNOT BE ORDERED.

NAME	OUTLINE	DESCRIPTION/CODE №	Q'TY
ﾎﾞﾙﾄｾｯﾄ BOLT SET		W3/8X40 999-999-076	1 (*1)
MSｺﾈｸﾀｰ MS CONNECTOR		854-460-335 999-999-074	1 (*1)
U/Wｺﾈｸﾀｰ U/W CONNECTOR		854-460-304 999-999-073	1 (*1)
図書 **DOCUMENT**			
装備要領書 INSTALLATION MANUAL		IME-13210-* 000-151-385	1
取扱説明書 OPERATOR'S MANUAL		OME-13210-* 000-151-384	1

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

PACKING LIST

TS-331A UNDERWATER UNIT

NAME	OUTLINE	DESCRIPTION/CODE №	Q'TY
ユニット UNIT			
発信器 UNDERWATER UNIT		MODEL854-000-360 000-060-118	1

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

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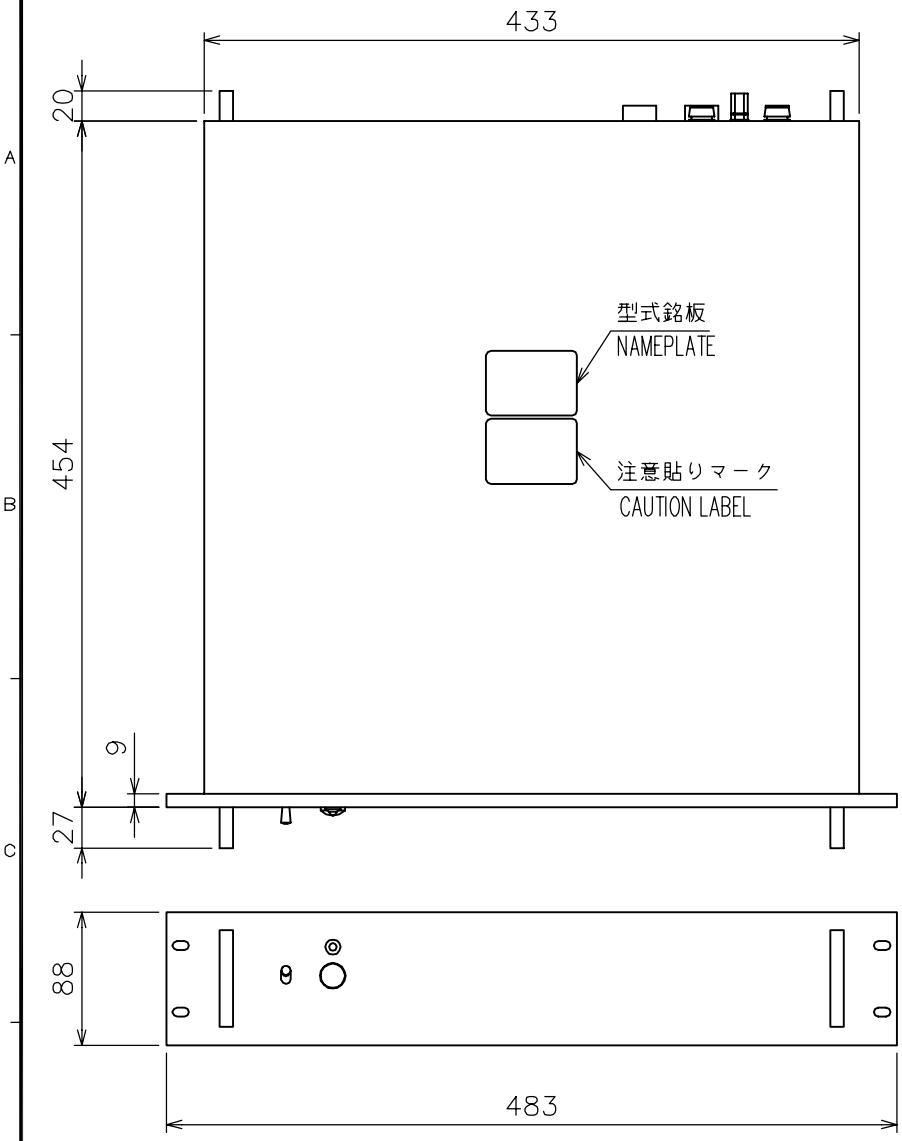
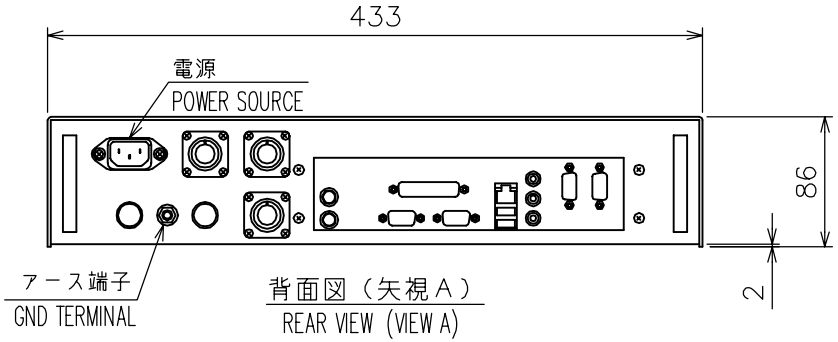
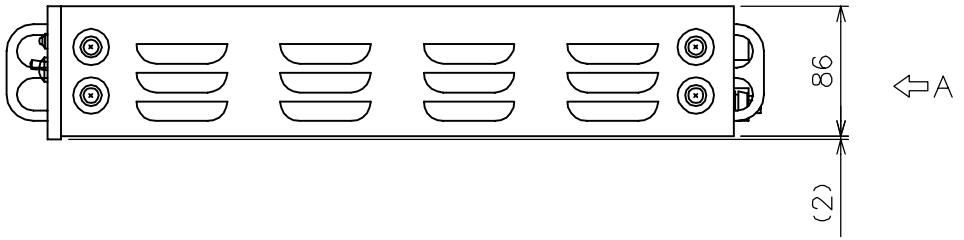


表 1 TABLE 1

寸法区分 (mm) DIMENSIONS	公差 (mm) TOLERANCE
L≦50	±1.5
50<L≦100	±2.5
100<L≦500	±3





注　記　　指定外の寸法公差は表1による。

NOTE　　TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.

DRAWN Oct. 13, '04 E. MIYOSHI			TITLE TS-331A
CHECKED TAKAHASHI. T			名称 ワイアードトロールソナー（卓上装備）
APPROVED Y. Hatai			外寸図
SCALE 1/5 MASS 8.3 ±10% kg			NAME WIRED TRAWL SONAR (DESKTOP MOUNT)
DWG.No. C1321-G01-A	01-024-100G-0		OUTLINE DRAWING

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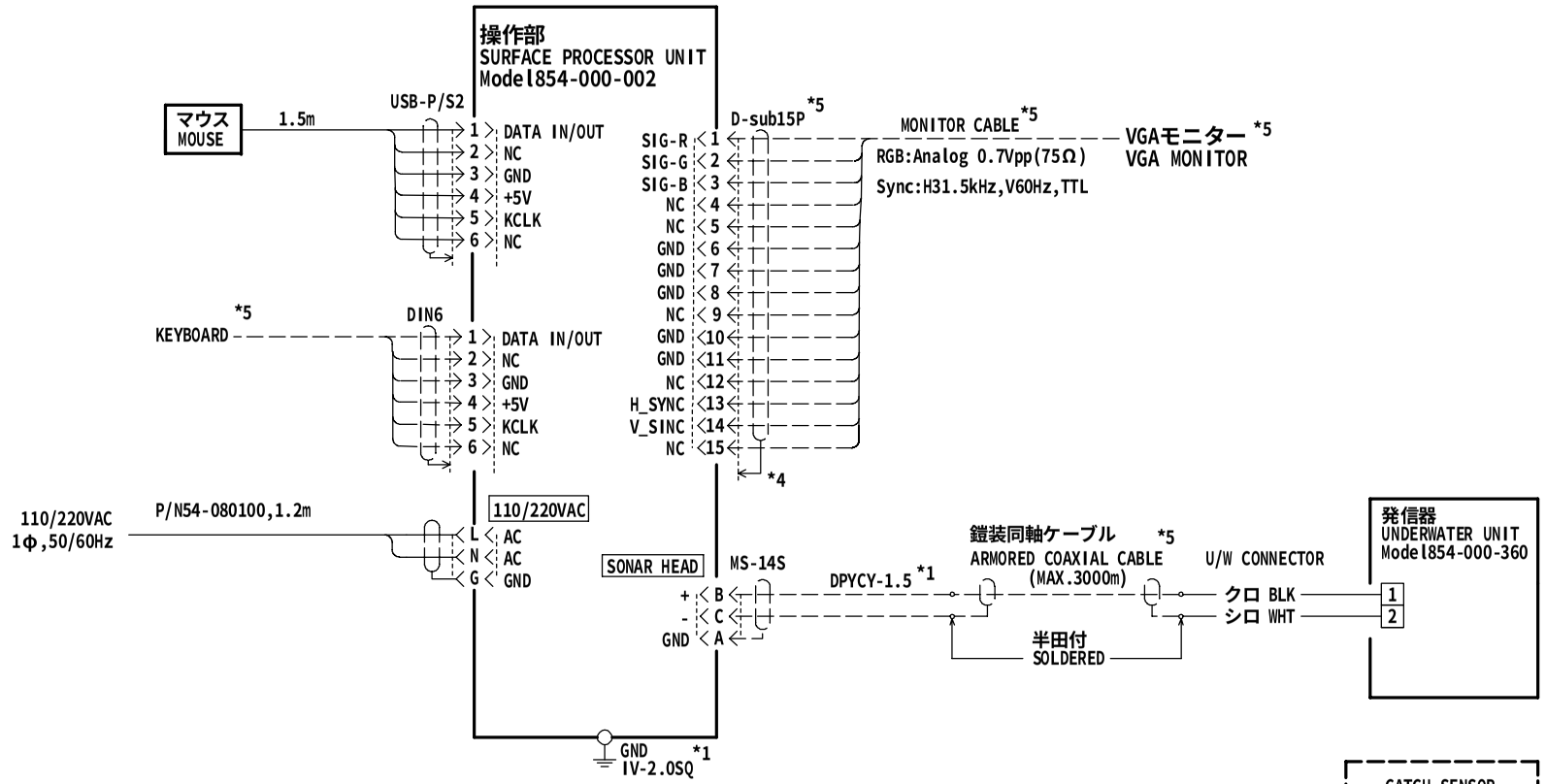
D-1

FURUNO



注記
＊1）造船所手配。
＊2）オプション。
＊3）工場にて取付済み。
＊4）コネクタクランプでアースに落とす。
＊5）ユーザー手配。

NOTE
*1. SHIPYARD SUPPLY.
*2. OPTION.
*3. FACTORY FITTED.
*4. GROUND THRU CONNECTOR CLAMP.
*5. USER SUPPLY.

DRAWN Feb. 7, '05 H. MAKI		TITLE	TS-331A
CHECKED TAKAHASHI.T		名称	ワイアードトロールソナー
APPROVED			相互結線図
SCALE / MASS kg		NAME	WIRED TRAWL SONAR
DWG No. C1321-C01- A			INTERCONNECTION DIAGRAM

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ECF
(Elemental Chlorine Free)
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